

Embryo 1 :

- **Urogenital system** Is derived **from intermediate mesoderm**.
 - **Nephrogenic cord gives rise to the urinary system.**
Urinary system consist of 3 :
 1. Pronephros
 2. Mesonephros
 3. Metanephros
 - **Pronephros:**
 - Forms at the beginning of the fourth week.
 - Represented by 7 to 10 solid cell groups in the cervical region called nephrotomes.
 - By the end of the fourth week, all pronephros have disappeared.
 - **Mesonephros:**
 - The mesonephros and mesonephric ducts are derived **from intermediate mesoderm** from upper thoracic to upper lumbar (L3) segments.
 - In the **fourth** week first excretory tubules of the mesonephros appear.
 - A **glomerulus** forms at their **medial extremity**. Around the glomerulus, the **tubules** form **Bowman's capsule**, and **together** these structures constitute **a renal corpuscle**.
 - By the end of the **second** month, the majority have disappeared.
- Metanephros:**
- the metanephros or **permanent kidney**, appears in the **fifth** week.
 - caudal portion of **mesonephric** duct will give **ureteric bud** which covered by **cap of mesenchyme** .

- **The ureteric bud gives the:**
 - Ureter
 - Renal pelvis
 - Major calyces
 - Minor calyces
 - Collecting tubules

- **The cap of the metanephric mesenchyme will give the:**
 - Bowmans capsule
 - Proximal convoluted tubule
 - Ascending & descending limb of Henle's loop
 - Distal convoluted tubule

- **The kidney "migrates" from its original location in the pelvis up into the abdominal cavity.**

- **Disorder of the number of kidneys :**
 - 1- Renal agenesis:
Renal agenesis : no kidney , unilateral or bilateral .

 - 2- Too many kidneys (doubling) :
Involved is an independent kidney, The **cause is a very early division of the ureter bud.**

- **Anomalies of rotation :**
 - the kidney and ureter is oriented:
 - Ventrally (missing rotation)
 - Dorsally (rotation of more than 90°)
 - Laterally (inverse rotation).
 - lead to a hydronephrosis

- **ectopic kidney :**
 - A kidney is ectopic when it does not lie in the lumbar fossa.
 - The ectopia is the result of an incomplete or missing ascent.
 - Location : in pelvic , thoracic , iliac , crossed .

- **Horseshoe kidney:**

1. It is assumed that it arises due to a joining of both kidneys during the 5th week when both organs still lie very close together specially in the lower pole.

- **Abnormal kidney size:**

- 1- **Hypoplasia:**

It results from an embryonic developmental stop of the kidney, The kidney is small .

- 2- **Aplasia:** In an aplastic kidney, a fibrous kidney primordium with its own derivatives of the mesonephric duct (Wolffian duct) is present.

- **Poly cystic kidney :** The kidneys develop large epithelial cysts that are localized in the renal parenchyma and lead to the loss of the functional tissue

- **Congenital ureteral abnormalities:**

1. **Course anomalies of the ureter**

Retrocaval / retroiliac ureter:

(retrocaval ureter): In this abnormality the right ureter traces out an "S" at the L4 level behind the vena cava

2. **Anomalies of the ureteral diameter**

Primary megaloureter due to an obstruction: in the terminal part of the ureter, leading to a dilatation.

3. **Abnormal number of ureters**

Disorders in the number of ureters belong to the **most** frequent anomalies of the urinary tract the cause , **from a premature branching of the ureter bud.**

4. **Complete doubling:**

Here a complete doubling of the ureters.